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REMARKS

This Amendment responds to the Final Office Action dated April 14, 2009, in which the Examiner rejected claims 1-17 under 35 U.S.C. §112, first paragraph. In response to the rejection, applicants have amended the claims. Reconsideration and reexamination are respectfully requested in view of the foregoing amendments and the following remarks.

The Examiner has maintained rejections under 35 U.S.C. §§ 102 (b) and 103 (a) as anticipated or obvious in view of December. The Examiner contends that the reference presents a coating made from an emulsion having an average particle size between about 50 and 100 nm since December purportedly discloses an average particle size ranging from 50 to 5000 nm, which allegedly overlaps with a coating having an average particle size including the claimed range of 50 to 100 nm. The Examiner contends that based upon this alleged overlap, December anticipates or renders obvious the claimed invention.

Applicants respectfully request reconsideration and maintain that December simply does not anticipate or render obvious the claimed invention as defined by the amended claims. December relates to a micron-sized particle emulsion, while the claimed invention relates to a nano-sized particle emulsion and coating made therefrom. December totally fails to teach or suggest how to make a nano-particle sized emulsion, and instead extols the benefits of a micron-sized emulsion. Nowhere in December does it suggest or disclose how to make or use a nano-emulsion, nor does it teach the significant and numerous advantages obtained therefrom. The slight possible overlap in particle size between December and the present invention does not amount to and cannot be stretched to support either an anticipation or an obviousness rejection where the claims define a nano-

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particle emulsion containing particles from 10 nm to 100 nm and an average particle size of 50 nm.

In the preparation of a polymeric emulsion, the emulsion prepared exists as a size distribution with particles ranging from a small size to a large size, normally following a normal distribution curve with the fraction with the highest number of particles found in the middle of the size distribution. It is extremely expensive and impractical to produce an emulsion with a single specified particle size for industrial use. Thus, all industrial emulsions include a size distribution with specified particle sizes at the lower and upper end of the size range for a fraction at least 1% of the total amount of all particles. Specification of the particle size and its distribution is very important for polymer emulsions used for electrophoretic coating. An emulsion with a small and narrow distributed particle size is preferred as widely different particle sizes cannot be closely packed, giving rise to a rougher coating upon electrophoretic deposition and hence less corrosion protection due to porosity in the coating layer. Polymeric coating with a minimum thickness is normally recommended to meet specified requirements for corrosion protection.

The size distribution of the nano-polymer emulsion claimed herein from 10-100 nm, covers an emulsion of particles with a diameter spread within only one order of magnitude and a size distribution of 10 times the difference from the lower end to higher end of the size distribution, with substantially all particles in the nanometric range. The narrow size distribution with a particle diameter within one order of magnitude produces a uniform emulsion to enable close packing of coating layer, and the use of all particles within the nanometric range leads to the special "nano effect" for a compact and porosity free

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electrophoretic coating to enable the deposition of a very thin layer of polymer at metal surface to meet specified requirements in corrosion protection.

December discusses a polymer emulsion with a wide size distribution covering two orders of magnitudes and a spread of 100 times difference from lower to higher end of the size distribution, with most if not all of the particles in the micron size range. These emulsions would require a thick coating to achieve desired corrosion protection of the underlying metal, and the packing of a mixture of nano and micron size particles with widely different sizes leads to a rough coating layer during electrophoretic deposition at metal surface. On the other hand, the nano-polymer coating as described in the present application with all particles in the nanometric range from 10-100 nm, and narrow particle distribution covering one order of magnitude and a spread of 10 times from the lower to the higher end of the size distribution leads to a quick and uniform polymerization during electrophoretic deposition in situ at the surface of the metallic substrate, gives rise to a thin and uniform coating layer with excellent corrosion protection and a drastic reduction in material cost.

Additionally, a small amount of organic solvent must be used to maintain the operation of the electrophoretic bath. There are two sources of organic solvent for electrophoretic coating. The first source is organic solvent added to the aqueous fraction of the electrophoretic bath for mixing with the polymer emulsion and the second source is organic solvent coming from emulsion itself, pigments and other additives added to the electrophoretic bath. "The amount of coalescing solvent is generally between about 0 to 15 percent by weight based on total weight of the resin solids," as stated in December's '188

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patent. This covers only organic solvent added to the aqueous fraction of the electrophoretic bath, not organic solvent coming from emulsions, pigments and other additives. As previously discussed, applicants have estimated from the reference that 4.9 wt% of organic solvent used in Example 1 and more than 50 wt% organic solvent used in Example 3 come from the polymer resin used to prepare the emulsion. The zero percent referred above appear to mean that the organic solvent from emulsion and pigment is sufficient and that there is no need to add any more organic solvent to the aqueous fraction to mix with the emulsion to produce the electrophoretic bath. Indeed, December's U.S. Patent No. 7,297,742 defines the term "substantially solvent free" to mean that the dispersion (the polymer emulsion) has a volatile organic content of less than about 5% of the composition. The value quoted for organic solvent used in a zero or solvent free bath are less than 5% organic solvent coming from emulsion and pigments, a value close to our estimation of the organic solvent content in Example 1 of December's earlier patent.

In summary, a small amount of organic solvent is needed for the operation of the electrophoretic bath for electrophoretic deposition of polymer coating at metal surface for corrosion protection. Less than 5% organic solvent in the polymer emulsion is considered as "solvent free," as stated in December's '742 patent with zero organic solvent added to the aqueous fraction for making the electrophoretic bath. Because of the "nano effect" from nanometric particles and uniform size distribution in nanometric range, the use of nanopolymer emulsion as described in our patent using all nanometric size particles with a narrow size distribution in the range of 10-100 nm with particle diameter within one order of magnitude and a spread of 10 times the difference from lower to higher end of the size

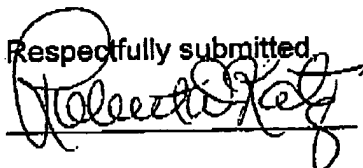
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distribution produces a high quality polymer coating with the use of very little organic solvent. The nano-particle size enables a drastic reduction in the overall emulsion volume, even though one obtains with a large increase in particle numbers. Hence, a significant reduction of organic solvent to less than 1% can be achieved for the operation of the electrophoretic bath.

December simply fails to teach or suggest the claimed nano-particle emulsion, the superior coating obtained or the advantages following therefrom. As such, applicants submit that the pending anticipation or obviousness rejections based upon December be reconsidered and withdrawn.

The Director is authorized to charge any fee required in connection with this response to Deposit Account No. 03-3125. If any extension is required in connection with the filing of this response, applicants hereby request same and authorize the fee therefor to be charge to Deposit Account No. 03-3125.

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Respectfully submitted,


Robert D. Katz, Esq.
Registration No. 30,141
Cooper & Dunham LLP
Customer No. 23432
30 Rockefeller Plaza
New York, New York 10112
patentdocketing@cooperdunham.com
Tel. No. (212) 278-0400
Fax No. (212) 391-0525

Attorney for Applicants